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ABSTRACT

Research has demonstrated that learning style preferences and how they are taken into account are closely related to learner achievement and satisfaction. The Learning Style Inventory (LSI) was the first comprehensive approach to the assessment of an individual's learning style in grades 3 through 12. The Productivity Environmental Preference Survey (PEPS) was designed for adults based on the same underlying factors and content analysis as the LSI. The PEPS surveys an individual's preferences in each of 20 different modalities. The modalities can be classified under the headings of environment, emotionality, sociological preferences, and physical needs. A study was conducted to examine changes for a random sample of adults (N=1,475) who had taken the PEPS. Adults selected from the national data base were divided into five age groups (ages 18-24; 25-34; 35-44; 45-54; and 55 and older). The results suggest that significant changes occur in adults in the area of their preferred productivity modality. The greatest differences found were between those in the age group of 18-24 and all of the older groups. In addition, there were several differences that occurred for individuals after the age of 55. Persons responsible for designing the learning and working environments for adults need to take individual differences into account and plan environments that are flexible enough to meet individual preferences for optimum learning and production to occur. (NB)

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Changes in Learning Style for a Random Sample of Individuals Ages 18 and older who responded to the Productivity Environmental Preference Survey, 1986.

by

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Introduction

When people learn, they perceive and think. They also interact with resources, methods, and environments. The tendencies and preferences that accrue from this personal experience bring about one's learning style-one's characteristic ways of processing information, feeling and behaving in learning situations. Research has demonstrated that learning style preferences and how they are taken into account are closely related to learner achievement and satisfaction. Although much of this research has not involved adults, the usefulness of learning-style diagnosis for higher and continuing education has been clearly demonstrated (Smith, 1982).

The learning style emphasis causes us to ask such questions as: In what particularly unique way does each individual prefer to learn and how can counselors and/or teachers present materials so they can be most easily mastered by the individual? There is overlap in the literature between the terms cognitive style and learning style. Generally, cognitive style refers to those individual variables that affect how one prefers to process information once they take it in through the senses. Learning style refers to those variables in the environment that affect how individuals prefer to learn.

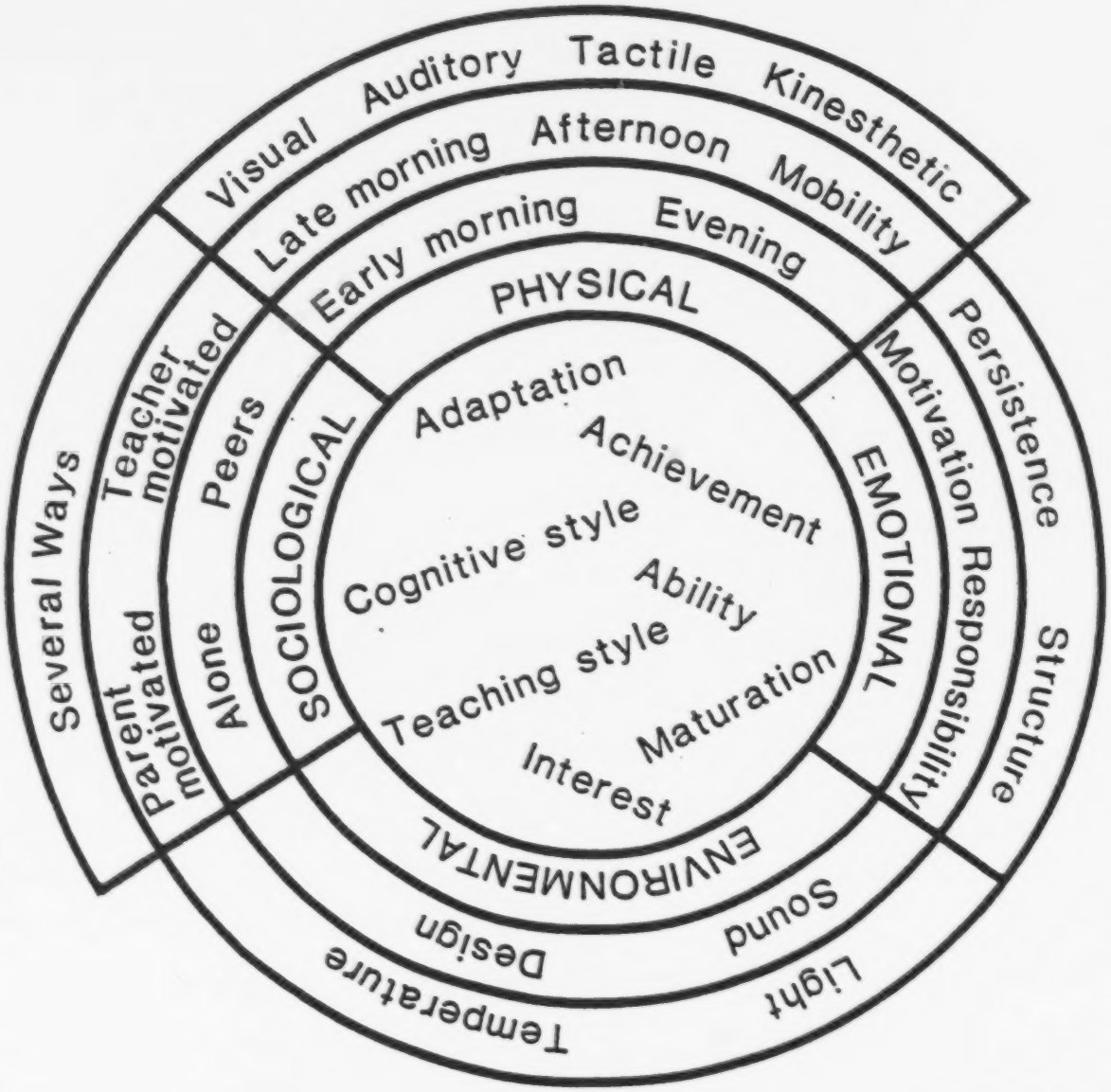
Learning Style Model

The Learning Style Inventory (LSI) (Dunn, Dunn & Price, 1986) was the first comprehensive approach to the assessment of an individual's learning style in grades 3 through 12. This instrument is an important and useful first step toward identifying the conditions under which an individual is most likely to learn, remember, and achieve. The learning style model (figure 1) is based on the Learning Style Inventory.

Figure 1

Learning Style Model

(Based on the Learning Style Inventory by Dunn, Dunn and Price 1975)



Designed by
Gary E. Price

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The Productivity Environmental Preference Survey (PEPS) (Dunn, Dunn, and Price, 1986) was designed for adults based on the same underlying factors and content analysis. Two of the LSI modalities are not included on the PEPS, these modalities are Parent Figure Motivated and Teacher Motivated.

Careful analysis of the individual's LSI or PEPS computerized profile identifies those elements that are critical to an individual's learning style. Further, the manual aids in prescribing the type of environment, instructional activities, social grouping(s), and motivating factors that maximize personal achievement.

The Inventories do not measure underlying psychological factors, value systems, or the quality of attitudes. Rather, they yield information concerned with the patterns through which learning occurs. They summarize the environmental, emotional, sociological, and physical preferences an individual has for learning - not why they exist.

In the center of the circle in Figure 1 there are several elements that interact with one's learning style. Not only do the learning style elements interact with each other such as mobility and structure, peer oriented and auditory but learning style also interacts with cognitive style and teaching style, is affected by maturation, the individual's ability to adapt to various kinds of situations, one's ability level and one's level of achievement. It's important in examining learning style in relation to these elements when working with individuals to help individuals understand the complexity of learning and development so that they can be more aware of the various factors. In addition, when doing research it is important to control these various variables so that one can determine

the impact on achievement that these various elements have.

The Productivity Environmental Preference Survey (PEPS) (1986) surveys individuals' preferences in each of twenty different modalities. The PEPS was developed through a content and factor analysis. It is a comprehensive approach to the identification of how adults prefer to function, learn, concentrate, and perform during educational or work activities in the following modalities: (a) environment (Sound, Temperature, Light, and Design); (b) emotionality (Motivation, Responsibility, Persistence, and the need for either Structure or flexibility); (c) sociological preferences (Learning Alone, with Peers, with Adults and/or in Several Ways; and (d) physical needs (Perceptual preference(s), Time of day, Intake, and Mobility). The twenty modalities include the following:

1. NOISE LEVEL - Quiet or Sound. Some people need quiet when they are learning, while others notice neither noise nor movement once they begin to concentrate; they can "block out" sound. Some people need sound; they invariably turn on a radio, stereo, or television whenever they study as a screen against random noise distractions.

2. LIGHT - Low or Bright. Some people work best under very bright light whereas others need dim or low light.

3. TEMPERATURE - Cool or Warm. Many individuals "can't think" when they feel hot, and others can't when they feel cold; some concentrate better in either a warm or cool environment.

4. DESIGN - Informal or Formal. Many individuals think best in a formal environment - seated on wooden, steel, or plastic chairs like those found in conventional classrooms, a library, or a kitchen. However, some learn better in an informal environment - on a lounge chair, a bed, the floor, on pillows, or on carpeting.

5. UNMOTIVATED/MOTIVATED. Motivation is the desire to achieve academically.

6. NON-PERSISTENT/PERSISTENT. This element involves a person's inclination either to complete tasks that are started or to take intermittent "breaks" and return to assignments or learning-activities later.

7. IRRESPONSIBLE/RESPONSIBLE. This element involves individuals' desire to do what they think they ought to do. Responsibility relates to whether an individual is more outer or inter directed. Responsible individual are more outer directed (they follow through based on anothers expectations) than inter directed.

8. STRUCTURE - Needs or Does Not Need Structure. This element involves an individual's need for specific directions or explanations prior to undertaking or completing an assignment.

9. LEARNING ALONE/ PEER ORIENTED LEARNER. Some individuals prefer to study/work by themselves while others prefer to work/learn with a friend or colleague; in the latter situation, discussion and interaction facilitate working or learning. Sometimes individuals prefer to study or work alone but in close proximity to someone.

10. AUTHORITY FIGURES PRESENT. Some people feel better or more comfortable when someone with authority or recognized special knowledge is present.

11. PREFERS LEARNING IN SEVERAL WAYS. This element has alternate meanings. It suggests the person may learn easily alone and also with other people present (peers, or with an authority, or in any combination) or that the person needs variety, as opposed to routine.

12. AUDITORY PREFERENCES.. This perceptual area describes people who can learn best when listening to verbal instruction such as a lecture, discussion, or recording.

13. VISUAL PREFERENCES. A learner whose primary perceptual strength is visual can recall what has been read or observed; such people, when asked for information from printed or diagrammatic material, often can close their eyes and visually recall what they had read or seen earlier.

14. TACTILE PREFERENCES - Students with tactile perceptual strengths need to underline as they read, take notes when they listen, and keep their hands busy - particularly if they also have low auditory preferences.

15. KINESTHETIC PREFERENCES - Learners with kinesthetic preferences require whole-body movement and/or real-life experiences to absorb and retain material to be learned. Such people learn most easily when they are totally involved. Acting, puppetry, and drama are excellent examples of kinesthetic learning; others include building, designing, visiting, interviewing, and role playing.

16. REQUIRES INTAKE - This area describes those individuals who often eat, drink, chew, or bite objects while concentrating - as opposed to those who prefer no intake until after they have finished studying.

17. FUNCTIONS BEST IN EVENING/MORNING - These are two of the four "time of day preferences". Evening and Morning are on a continuum; if a score falls below 40, the individual tends to be an evening person; if the score is above 60, the individual most prefers to learn or work in the morning.

18. FUNCTIONS BEST IN LATE MORNING - The energy curve for these individuals is highest in the late morning and they prefer to learn or work during this time of day.

19. FUNCTIONS BEST IN AFTERNOON - The energy curve for these individuals is highest in the afternoon and they prefer to learn during this time of day.

20. MOBILITY - How quietly can the person sit - and for how long? Some people need frequent "breaks" and must move about the instructional or work environment. Others can sit for hours while engaged in learning or working- particularly if they are interested in the task.

Statement of Problem

In the research on learning style is a continued debate as to whether learning style characteristics are basically a stable indicator of how people respond or do they change over time. Keefe (1979) defined Student Learning Style as "Learning styles are characteristic cognitive, affective, and physiological behaviors that serve as relatively stable indicators of how learners perceive, interact with, and respond to the learning environment." (p. 4)

Previous research by Price examining changes in grade levels 3 through 12 indicated that there are many variables that change across grade level and, in fact, follow the developmental curve for both males and females. Such changes (Price, Dunn, Dunn, 1976,1977) include; the lower the grade level the more individuals prefer to learn using their tactile and kinesthetic senses. The higher the grade level the more individuals prefer to learn using their auditory and visual senses. Food intake is significantly related to the developmental growth curve for females but is not significantly

different across grade levels for males. In the area of teacher motivated, individuals are significantly more teacher motivated at the lower grade levels than at the higher grade levels. For certain learning style variables there are significant differences related to development during the middle school years. There are significant differences in peer motivated, adult motivated, self-motivated, responsibility, and persistence during these years. After grade ten females are less motivated than males. This may be related to culturalization.

We do not have longitudinal research as this point to address the issues at to why the afore mentioned changes occurred. The changes may be related to maturation or adaptation to instructional methodologies. Adaptation would indicate that individuals who are able to be flexible and adapt to the learning environments are able to persist even when the educational system is not designed to meet individual learning style preference differences. Whereas, individuals that are not able to be flexible in moving from tactile and kinesthetic modalities to visual and auditory learning modalities may be the individuals who drop out and/or are classified as "learning disabled". All of the research demonstrates that "learning disabled" students are t/k (tactile and kinesthetic) learners. I would suggest that the "LD" label be used to identify students that learn differently and the fault lies not in the individual but the inability of our teachers and schools to respond to the needs of some individuals!

Description of Research

This research was designed to look at changes for a random sample of adults over the age of 18 who have taken the Productivity Environmental Preference Survey. A total of 1475 individuals were randomly selected from the national data base. The adults were divided into the following age groups: ages 18-24; 25-34; 35-44; 45-54; and 55 and over. Table 1 has a break down of the number in each age group and means for each of the age groups for each of the variables that entered the discriminant equation. Table 2 is a summary for females and Table 3 is a summary for males.

Overall Group

The order the variables entered the discriminant equation are indicated in Table 1 by order and they are discussed in the narrative. The variable that entered the discriminant equation first was "afternoon." All of the individuals were significantly different from those in the age group of 18 to 24. The 55 and older group were significantly different from all of those individuals younger than 34. Younger individuals prefer to learn more in the afternoon than older individuals. Older individuals prefer more structure. Younger individuals indicate they are more responsible which would suggest that they are they are more external, as opposed to internal. Older individuals need more mobility and they prefer to learn more through their auditory sense. The younger individuals prefer to learn more through their kinesthetic sense. Older individuals like a more formal design. Younger individuals are more persistent. Older individuals are more motivated. Younger individuals like authority figures present more than do older individuals, they also like a warmer environment and they prefer intake.

Younger individuals prefer to be more productive in the evening, and older individuals are more productive in the morning. Older individuals like to have sound present more than younger individuals. Older individuals are able to learn more in several ways (sometimes by themselves, sometimes with peers or sometimes with adults present) than do younger individuals.

Younger people prefer to learn in the afternoon, are responsible, prefer to learn through their kinesthetic sense, are persistent, like authority figures present, like a warmer environment, prefer intake and prefer to learn in the evening when compared to older individuals.

The major differences for adults were those below the age of 24 and above the age of 24 with additional changes after age 34. These changes were more outstanding for younger individuals, and, in general, once individuals reach the age of 35 there were not many significant changes.

The older individuals prefer structure, require more mobility, prefer to learn through their auditory sense, like a formal design, are motivated, prefer to learn in the morning, like sound present, and prefer to learn in several ways.

Females

The next summary is for Table 2, a random sample of adult females. The younger females prefer to learn in the afternoon, are responsible, motivated, prefer a formal design, prefer to learn in several ways, and prefer to learn in the morning. Older females like structure, need mobility, are persistent, and prefer to learn through their kinesthetic sense. Also, older females prefer to learn through their auditory sense, prefer intake, want authority figures present, and prefer to learn alone. Motivation is highest for females who are

between the ages of 18 and 54. Individuals prefer a warm environment if they are between the ages of 35 and 54. Females between the ages of 25 and 34 prefer to be productive in the late morning, and after age 55 females prefer to be productive in the evening rather than in the morning.

Younger females do not want as much structure or mobility, not persistent, do not want to learn through the kinesthetic sense, do not want to learn through their auditory sense, do not prefer intake, want a cooler environment, do not want authority figures present and want to learn more alone when compared to older females.

Females who are older, over age 55, are not as productive in the afternoon, not responsible, not motivated, do not want a formal design, want a cooler environment, (a warmer temperature seems to be preferred most by individuals in the middle ages (35-55) compared to the two extremes) do not want to learn in several ways, do not prefer late morning, and prefer to learn more in the evening compared to younger females.

Males

Summary of Table 3, a random sample of adult males. Younger adult males prefer more structure, prefer to learn through their auditory sense, prefer to have mobility, and prefer to learn through their kinesthetic sense. If the males are less than age 44, they prefer intake, want a cooler environment, and prefer to learn in the morning.

Males who are older like a more formal design, are motivated, persistent , like authority figures present and are responsible. Older males do not want structure, do not want to learn through their

auditory sense, do not need mobility, do not want intake, and do not prefer to learn through their kinesthetic sense compared to younger males.

Younger males want an informal design, are not motivated or persistent, do not want authority figures present, not responsible, and prefer to be more productive in the evening compared to older males.

In summary, the are significant changes that occur in adults in the area of their preferred productivity modality. The greatest differences are between the ages of 18 and 24 and older individuals. In addition their are several differences that occur for individuals after the age of 55. Additional research needs to be conducted to see why modality changes are occurring. It would suggest that adults are continuing to develop throughout life. Those individuals responsible for designing the learning and working environments for adults need to take individual differences into consideration and design an environment that is flexible enough to meet individual preferences for optimum learning and production to occur.

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Table 1

Random Sample of Total Group

Productivity Environmental Preference Survey Data, 1986

Variable		Group Number	5	4	3	2	1
		Age	18-24	25-34	35-44	45-54	55 and over
		N=	264	351	470	235	155
No.	Name				Means		
19(1-4;A-5)*	Afternoon		9.34	7.48	7.14	7.07	6.91
8(*)	Structure		8.32	8.13	8.61	8.98	10.27
7(*)	Responsible		26.10	26.02	26.24	25.68	23.39
20(*)	Mobility		14.94	15.77	15.93	16.53	18.17
12(*)	Auditory		11.18	11.01	11.54	11.81	12.79
15(A-3;A-4;A-5)	Kinesthetic		16.15	16.33	15.90	15.29	15.04
4(*)	Design		15.64	16.97	17.13	17.99	17.68
6(*)	Persistent		17.47	17.45	17.50	17.45	17.18
5(*)	Motivation		19.27	20.72	20.59	20.45	20.32
10(*)	Authority Figure Pre		12.86	11.91	11.70	11.27	11.55
3(*)	Temperature		16.32	16.99	17.02	15.91	15.89
16(*)	Intake		21.05	20.85	20.88	20.22	19.22
17(*)	Even/Morning		22.41	25.91	26.73	26.78	25.98
1(*)	Noise Level		14.03	14.89	15.22	15.13	15.26
11(1-3;2-3;1-4;2-4;A-5)	Several Ways		14.17	14.87	14.71	14.57	14.69

*The number between "()" indicates those age groups that are significantly different from each other. An "A" means all of the groups. For instance "A-5" means all of the other four groups are significantly different from group #5.

Table 3

Random Sample of Males

Productivity Environmental Preference Survey Data, 1986

Variable No.	Name	Group No. 5	4	3	2	1
		Age 18-24	25-34	35-44	45-54	55 and over
		N= 82	79	139	84	35
		Means				
8(2-4;3-4;A-5)*	Structure	10.43	9.30	8.16	7.79	8.46
4(A-4;A-5)	Design	15.17	16.90	17.33	17.88	18.29
5(2-4;3-4;A-5)	Motivation	18.51	20.56	20.62	19.76	20.09
12(2-4;3-4;A-5)	Auditory	12.87	12.54	11.39	10.95	10.77
6(A-4;A-5)	Persistent	17.24	17.25	17.53	16.95	17.43
10(")	Author. Pig Pr	12.99	11.84	11.42	10.70	17.29
3(")	Temperature	14.71	15.57	15.65	14.06	14.71
7(")	Responsible	22.90	24.23	25.78	25.51	26.29
20(")	Mobility	18.26	16.93	16.17	15.19	15.31
16(")	Intake	20.84	21.94	20.48	19.98	18.86
17(")	Evening/Morning	21.95	24.09	25.85	25.75	24.66
15(")	Kinesthetic	16.09	16.48	15.76	14.94	15.09

*The number between "()" indicates those age groups that are significantly different from each other. An "A" means all of the groups. For instance "A-5" means all of the other four groups are significantly different from group #5.